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- (58) **Field of Classification Search**

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H01L 29/1095; H01L 29/0696; H01L  
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See application file for complete search history.

- (56)
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- (57) **ABSTRACT**

- A semiconductor device includes field electrode structures extending in a direction vertical to a first surface in a semiconductor body. Cell mesas are formed from portions of the semiconductor body between the field electrode structures and include body zones that form first pn junctions with a drift zone. Gate structures between the field electrode structures control a current flow through the body zones. Auxiliary diode structures with a forward voltage lower than the first pn junctions are electrically connected in parallel with the first pn junctions, wherein semiconducting portions of the auxiliary diode structures are formed in the cell mesas.

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- (52) **U.S. Cl.**  
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